

**PATENT ABSTRACTS OF JAPAN**

(11)Publication number : 2001-075272

(43)Date of publication of application : 23.03.2001

---

(51)Int.Cl. G03F 7/023  
G02F 1/1368  
G03F 7/004  
G03F 7/022  
H01L 21/027

---

(21)Application number : 11-254189

(71)Applicant : TOKYO OHKA KOGYO CO LTD

(22)Date of filing : 08.09.1999

(72)Inventor : AOKI TOMOSABURO  
KATO TETSUYA

---

(54) POSITIVE TYPE PHOTORESIST COMPOSITION FOR PRODUCTION OF LIQUID CRYSTAL DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To inexpensively realize a positive type photoresist composition for the production of a liquid crystal device excellent in the perpendicularity of a resist pattern shape and having small dependency of resolution on film thickness.

SOLUTION: (A) A cresol novolak resin having an Mw of 2,000-10,000 obtained by condensing a cresol mixture of 30-60 mol% m-cresol and 70-40 mol% p-cresol and (B) a photosensitive component comprising a mixture of (b1) a naphthoquinonesulfonic ester of a cresol novolak resin having an Mw of 2,000-10,000 obtained by condensing only m-cresol or 30-60 mol% m-cresol and 70-40 mol% p-cresol and (b2) a naphthoquinonesulfonic ester of 2,3,4,4'-tetrahydroxybenzophenone are dissolved in an organic solvent. The amounts of the components b1 and b2 are 10-40 wt.% and 3-8 wt.%, respectively, based on the amount of the component A.

---

**LEGAL STATUS**

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the  
examiner's decision of rejection or application  
converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

## CLAIMS

[Claim(s)]

[Claim 1] The positive type photoresist constituent for liquid crystal device manufacture which comes to dissolve in the (C) organic solvent as the following blending ratio of coal is also about the following (A) component and the (B) component which consists of the following (b1) and (b2) a component.

(A) Component : alkali fusibility resin which consists of cresol novolak resin of the weight average molecular weight 2000-10000 obtained by condensing mixed cresol (30-60 mol % of m-cresol, and 70-40 mol % of p-cresol) with the bottom formaldehyde of acid-catalyst existence.

Component : (b1) (B) Condense m-cresol independent or 30-60 mol % [ of m-cresol ] and 70-40 mol [ of p-cresol ] % mixed cresol with the bottom formaldehyde of acid-catalyst existence. The naphthoquinone -1 of the cresol novolak resin of the weight average molecular weight 2000-10000 obtained, and a 2-diazido-5-sulfonate, (b2) The photosensitive component which consists of mixture of the naphthoquinone -1 of the phenolic compound of molecular weight 200-600, the 2-diazido-5-sulfonate, and \*\* which have at least three hydroxyl groups.

Blending ratio of coal: (b1) The content of a component is 10 - 40 % of the weight to the (A) component, and (b2) the content of a component is 3 - 8 % of the weight to the (A) component.

[Claim 2] (b1) The positive type photoresist constituent for liquid crystal device manufacture according to claim 1 whose component is the esterification object reacted and obtained to the cresol novolak resin in a component (b1) in a naphthoquinone -1, a 2-diazido-5-sulfonate, or 30 - 100 % of the weight of its halogenide.

[Claim 3] (b2) The positive type photoresist constituent for liquid crystal device manufacture according to claim 1 or 2 whose phenolic compound in a component is at least one chosen from a 2, 3, and 4-trihydroxy benzophenone and 2, 3 and 4, and 4'-tetra-hydroxy benzophenone.

[Claim 4] (b2) The positive type photoresist constituent for liquid crystal device manufacture according to

claim 1 or 2 whose phenolic compound in a component is at least one chosen from Tori (hydroxy phenylmethane) and its alkylation object.

[Claim 5] (b2) The positive type photoresist constituent for liquid crystal device manufacture according to claim 4 whose phenolic compound in a component is at least one chosen from Tori's (hydroxy phenylmethane) alkylation object expressed with the following general formula (I).

[Formula 1]

(R1, R2, and R3 in a formula are the low-grade alkyl group of a carbon number 1-4 independently, respectively.)

[Claim 6] (C) The positive type photoresist constituent for liquid crystal device manufacture given in claim 1 whose organic solvent is at least one chosen from 2-heptanone, ethyl lactate, and propylene-glycol-monomethyl-ether mono-acetate thru/or any 1 term of 5.

[Claim 7] (C) The positive type photoresist constituent for liquid crystal device manufacture according to claim 6 whose organic solvent is the partially aromatic solvent of 2-heptanone and ethyl lactate, or a partially aromatic solvent of 2-heptanone and propylene-glycol-monomethyl-ether mono-acetate.

## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the positive type photoresist constituent used suitable for liquid crystal device manufacture of a thin film transistor (THIN FILM TRANSISTOR) etc.

[0002]

[Description of the Prior Art] Although the display using a liquid crystal device has spread quickly in recent years, the background has low-pricing of a liquid crystal display. Naturally, the cost cut of various ingredients, such as a resist used in the manufacture, is also demanded with such low-pricing. It is important requirements from such a background that the resist for today's liquid crystal device manufacture is cheap to the 1st on industry. Coincidence also has the request of the improvement in a resist property, for example, control \*\* of the improvement of the perpendicularity (rectangle nature) of \*\* resist pattern configuration and the thickness dependency of \*\* definition is desired.

[0003] However, achievement of a request of the above-mentioned improvement in a resist property is by no means easy considering a cheap thing as the 1st condition. That is, although the resist pattern size of 2.0-3.0 micrometers is usually needed in liquid crystal device manufacture using the photoresist about the improvement of the perpendicularity (rectangle nature) of \*\* resist pattern configuration, there is an inclination for the cross-section configuration to turn into a taper configuration, and a resist pattern which is excellent in perpendicularity is desired. If expensive alkali fusibility resin and a photosensitive component are used, a configuration improvement in such resist pattern size will not be difficult. However, the improvement is not easy if premised on selection of a cheap ingredient.

\*\* Although large-sized glass angle substrates (for example, 360mmx460mm, 550mmx650mm, 600mmx720mm, etc.) are used for a substrate in liquid crystal device manufacture about control of the

thickness dependency of definition, dust may often adhere on a substrate from the precision of that it is very a large area and a clean room falling compared with the silicon wafer for semi-conductor manufacture. If a resist is applied after such dust has adhered to the substrate, the resist thickness of the dust circumference will be formed thickly. And if patterning, such as exposure and development, is performed continuously, the fault that a resist pattern cannot be formed will arise in a thick thickness part. Therefore, even when such dust adheres and a difference arises in resist thickness, development of a resist with few thickness dependencies of definition is demanded that the resist pattern as a mask pattern can be formed, but the development is not easy if premised on selection of a cheap ingredient.

[0004]

[Problem(s) to be Solved by the Invention] Therefore, in this invention, a cheap thing is made into the 1st condition, it excels in the perpendicularity of a resist pattern configuration, and the thickness dependency of definition aims at offer of few positive type photoresist constituents for liquid crystal device manufacture.

[0005]

[Means for Solving the Problem] A header and this invention were able to be completed for the purpose of this invention being attained by this invention persons' using specific cresol novolak resin for alkali fusibility resin, as a result of repeating research wholeheartedly, and using the mixture of the specified quantity rate of the naphthoquinone -1 of specific cresol novolak resin, a 2-diazido-5-sulfonate, and the naphthoquinone -1 of a specific phenolic compound and a 2-diazido-5-sulfonate for a photosensitive component.

[0006] That is, this invention offers the positive type photoresist constituent for liquid crystal device manufacture which comes to dissolve in the (C) organic solvent as the following blending ratio of coal is also about the following (A) component and the (B) component which consists of the following (b1) and (b2) a component.

(A) Component : alkali fusibility resin which consists of cresol novolak resin of the weight average molecular weight 2000-10000 obtained by condensing mixed cresol (30-60 mol % of m-cresol, and 70-40 mol % of p-cresol) with the bottom formaldehyde of acid-catalyst existence.

Component : (b1) (B) Condense m-cresol independent or 30-60 mol % [ of m-cresol ] and 70-40 mol [ of p-cresol ] % mixed cresol with the bottom formaldehyde of acid-catalyst existence. The naphthoquinone -1 of the cresol novolak resin of the weight average molecular weight 2000-10000 obtained, and a 2-diazido-5-sulfonate, (b2) The photosensitive component which consists of mixture of the naphthoquinone -1 of the phenolic compound of molecular weight 200-600, the 2-diazido-5-sulfonate, and \*\* which have at least three hydroxyl groups.

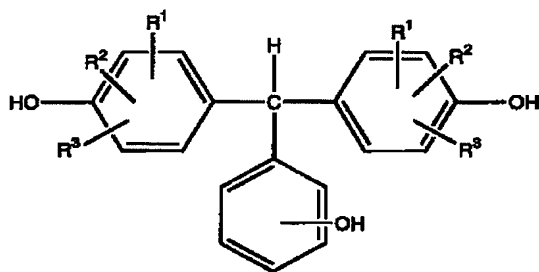
Blending ratio of coal: (b1) The content of a component is 10 - 40 % of the weight to the (A) component, and (b2) the content of a component is 3 - 8 % of the weight to the (A) component. Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose component (b1) is the esterification object reacted and obtained to the cresol novolak resin in a component (b1) in a naphthoquinone -1, a 2-diazido-5-sulfonate, or 30 - 100 % of the weight of its halogenide. Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose phenolic compound in a component (b2) is at least one chosen from a 2, 3, and 4-trihydroxy benzophenone and 2, 3 and 4, and 4'-tetra-hydroxy benzophenone. Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose

phenolic compound in a component (b2) is at least one chosen from Tori (hydroxy phenylmethane) and its alkylation object. Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose phenolic compound in a component (b2) is at least one chosen from Tori's (hydroxy phenylmethane) alkylation object expressed with the following general formula (I).

[0007]

[Formula 2]

(I)



[0008] (R1, R2, and R3 in a formula are the low-grade alkyl group of a carbon number 1-4 independently, respectively.)

Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose (C) organic solvent is at least one chosen from 2-heptanone, ethyl lactate, and propylene-glycol-monomethyl-ether mono-acetate. Moreover, this invention offers the aforementioned positive type photoresist constituent for liquid crystal device manufacture whose (C) organic solvent is the partially aromatic solvent of 2-heptanone and ethyl lactate, or a partially aromatic solvent of 2-heptanone and propylene-glycol-monomethyl-ether mono-acetate.

[0009] In addition, the photoresist containing the photosensitive component which consists of mixture of the novolak resin esterified by alkali fusibility novolak resin and o-naphthoquinonediazide compound and the low-molecular-weight phenols esterified by o-naphthoquinonediazide compound is indicated by JP,8-272090,A and JP,8-286370,A as a conventional technique. However, these official reports do not indicate the photoresist for liquid crystal devices. Moreover, obtaining a positive type photoresist constituent as low cost is also is not indicating at all to the specific cresol novolak resin defined as this invention using the photosensitive component which consists of specific mixture, either. Furthermore, the specific blending ratio of coal of the photosensitive component in this invention is not indicated at all, either.

[0010]

[Embodiment of the Invention] The alkali fusibility resin which consists of cresol novolak resin of the weight average molecular weight 2000-10000 obtained by condensing mixed cresol (m-cresol 30 - 60-mol % and p-cresol 70 - 40-mol %) with the bottom formaldehyde of acid-catalyst existence needs to be used for the (A) component in this invention. the rate of m-cresol and p-cresol -- the above -- that a remaining rate of membrane falls that it is out of range \*\*\*\* -- sublimate -- generating -- being easy -- it is not desirable. moreover, weight average molecular weight -- the above -- it falls [ sensibility or detachability ] that it is out of range and is not desirable. From a cheap thing being the 1st condition, such cresol novolak resin is compounded [ formaldehyde / of acid-catalyst existence / bottom ] by the usual approach used as the condensing agent in the mixed cresol of m-cresol of the above-mentioned predetermined range, and

p-cresol that what is necessary is just well-known cresol mold novolak resin. The novolak resin which blended xylenols and trimethyl phenols further as phenols becomes expensive and is not desirable. As an acid catalyst, although oxalic acid, p-toluenesulfonic acid, an acetic acid, etc. are mentioned, the resin obtained using oxalic acid can be cheap, can obtain easily, and is desirable. Although formalin or a trioxane etc. which dissolved formaldehyde and formaldehyde in water can be used as formaldehyde, formalin is usually used. The range of m-cresol and p-cresol is 36-60-mol % and 64-40-mol %, respectively, and becomes [ weight average molecular weight / with high sensitivity ] being the range of 2000-5000 more and is desirable.

[0011] the (B) component in this invention -- the following -- being shown (b1) -- it is necessary to be the mixture of the specified quantity rate of a component (b2) (b1) Components are the naphthoquinone -1 of the cresol novolak resin of the weight average molecular weight 2000-10000 obtained by condensing m-cresol independent or 30-60 mol % [ of m-cresol ] and 70-40 mol [ of p-cresol ] % mixed cresol with the bottom formaldehyde of acid-catalyst existence, and a 2-diazido-5-sulfonate. the rate of m-cresol and p-cresol -- the above -- that a remaining rate of membrane falls that it is out of range \*\*\*\* -- sublimate -- generating -- being easy -- it is not desirable. moreover, weight average molecular weight -- the above -- it falls [ sensibility ] that it is out of range and is not desirable. (b2) Components are the naphthoquinone -1 of the phenolic compound of the molecular weight 200-600 which has at least three hydroxyl groups, and a 2-diazido-5-sulfonate. molecular weight -- the above -- it falls [ definition ] that it is out of range and is not desirable. And the content of a component (b1) is 15 - 30 % of the weight preferably ten to 40% of the weight to the (A) component, and (b2) the content of a component is 5 - 8 % of the weight preferably three to 8% of the weight to the (A) component. (b1) and (b2) the content of a component -- the above -- a remaining rate of membrane falls that it is out of range, and the obtained resist film becomes an inverse tapered shape configuration and is not desirable.

[0012] (b1) From a thing cheap like the (A) component being the 1st condition, the cresol novolak resin of a component is compounded in the mixed cresol of m-cresol of the above-mentioned predetermined range, and p-cresol by the usual approach which used the bottom formaldehyde of acid-catalyst existence as the condensing agent only for m-cresol that what is necessary is just well-known cresol mold novolak resin. The novolak resin which blended xylenols and trimethyl phenols further as phenols becomes expensive and is not desirable. An acid catalyst and formaldehyde are the same as that of the above-mentioned (A) component. The range of m-cresol and p-cresol has a highly desirable more remaining rate of membrane in it being 36-60-mol % and 64-40-mol %, respectively. It becomes [ with high sensitivity ] being the range of 2000-6000 more and is desirable, when weight average molecular weight is m-cresol independent novolak resin and it is 5000-10000, and mixed cresol novolak resin.

[0013] Subsequently, it is necessary to use such cresol novolak resin as the esterification object which esterified by the naphthoquinone -1, the 2-diazido-5-sulfonic acid or its halogenide, and the well-known usual reaction, and was obtained. The halogenide has a naphthoquinone -1 and common 2-diazido-5-sulfonic-acid chloride. The solution which specifically prepared the solution which dissolved this resin in organic solvents, such as an acetone, a methyl ethyl ketone, 2-heptanone, dioxane, and a tetrahydrofuran, was made to dissolve further a naphthoquinone -1 and 2-diazido-5-sulfonic-acid chloride in this, and subsequently dissolved basic catalysts, such as triethylamine and a pyridine, in the same organic

solvent is dropped, and an esterification reaction is carried out enough. Subsequently, the esterification object made into the purpose can be obtained by using a superfluous base after acid water-solution neutralization and as pure water under notes, rinsing a sludge and drying. When using especially 2-heptanone as a solvent, like the above, subsequently acid water-solution neutralization may add pure water, may extract 2-heptanone layer, may condense this layer, may obtain as a 2-heptanone solution, and may use this as it is. As for esterification, it is desirable to make 50 – 80 % of the weight react preferably to cresol novolak resin a naphthoquinone -1, a 2-diazo-5-sulfonic acid, or 30 – 100 % of the weight of its halogenide. If it deviates from these range, a remaining rate of membrane falls and is not desirable.

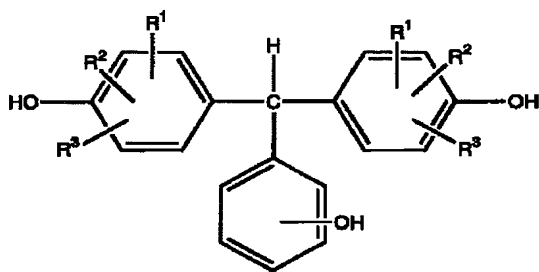
[0014] (b2) Although it will not be limited especially if it has the above-mentioned molecular weight, it specifically considers as a desirable thing, and the phenolic compounds of the molecular weight 200–600 which has at least three hydroxyl groups used for a component are polyhydroxy benzophenones, such as a (b)s 2 and 3, 4-trihydroxy benzophenone, 2, 3 and 4, and 4'-tetra-hydroxy benzophenone.;

(b) Tris (4-hydroxyphenyl) methane, a bis(4-hydroxy - 3, 5-dimethylphenyl)-2-hydroxy phenylmethane, A bis(4-hydroxy - 2, 5-dimethylphenyl)-2-hydroxy phenylmethane, A bis(4-hydroxy - 2, 3, 5-trimethyl phenyl)-2-hydroxy phenylmethane, A bis(4-hydroxy - 2, 3, 5-trimethyl phenyl)-3-hydroxy phenylmethane, Tori (hydroxy phenylmethane), such as a bis(4-hydroxy - 2, 3, 5-trimethyl phenyl)-4-hydroxy phenylmethane, and its alkylation object are mentioned. Also in these, it is the cheapest, and since it excels in thermal resistance and a resist pattern configuration, a 2, 3, 4-trihydroxy benzophenone, 2, 3 and 4, and 4'-tetra-hydroxy benzophenone or Tori's (hydroxy phenylmethane) alkylation object expressed with the following general formula (I) is desirable.

[0015]

[Formula 3]

(I)



[0016] (R1, R2, and R3 in a formula are the low-grade alkyl group of a carbon number 1–4 independently, respectively)

These phenolic compounds are used as an esterification object which esterified like (b1) by the naphthoquinone -1, the 2-diazo-5-sulfonic acid or its halogenide, and the well-known usual reaction, and was obtained. the degree of esterification of (b2) -- whenever [ esterification ] -- (mol of the halogenide this sulfonic acid to the total number of mols of the phenolic hydroxyl group which an one-mol phenolic compound has, or number) expressing -- 10 – 100-mol % -- it is desirable 50 – 80-mol% of preferably. It becomes [ if it deviates from these range, a remaining rate of membrane will fall, and ] an inverse tapered shape configuration and is not desirable. (b1) And (b2) a component can also use two or more sorts together if needed.

[0017] The (C) component in this invention is the organic solvent which may dissolve (A), the (B) component, and the following additive used if needed. Although it is not limited especially if it is a well-known resist solvent, for example An acetone, A methyl ethyl ketone, a cyclohexanone, methyl isoamyl ketone, Ketones, such as 2-heptanone; Ethylene glycol, propylene glycol, Diethylene-glycol and ethylene glycol mono-acetate, propylene glycol mono-acetate, Diethylene-glycol mono-acetate or these monomethyl ether, Polyhydric alcohol and the derivatives of those, such as the monoethyl ether, the monopropyl ether, the monobutyl ether, or the monophenyl ether; Ring type ether; and ethyl lactate like dioxane, Ester, such as methyl acetate, ethyl acetate, butyl acetate, methyl pyruvate, pyruvic-acid ethyl, methoxy methyl propionate, and ethoxy ethyl propionate, can be mentioned. These may be used independently, and may mix and use two or more sorts. Since it excels in the spreading nature to a large-scale angle substrate especially, at least one chosen from 2-heptanone, ethyl lactate, and propylene-glycol-monomethyl-ether mono-acetate is desirable. Moreover, a partially aromatic solvent is sufficient as the (C) component, and the partially aromatic solvent of 2-heptanone, ethyl lactate or 2-heptanone, and propylene-glycol-monomethyl-ether mono-acetate can also be used for it. 20 - 40 % of the weight of 2-heptanone, 80 - 60 % of the weight of ethyl lactates and 20 - 40 % of the weight of 2-heptanone, and 80 - 60 % of the weight of propylene-glycol-monomethyl-ether mono-acetate of the mixed rate in that case are good. However, when adopting a partially aromatic solvent, it is advantageous in this invention that prepare the mixed solvent beforehand, and do not add the additive added to this (A) and (B), or if needed, for example, (b1) use 2-heptanone for the solvent at the time of component manufacture, and this residue serves as a partially aromatic solvent at a target as a result of ethyl lactate or propylene-glycol-monomethyl-ether mono-acetate on a production process.

[0018] The additive which has other additives, for example, compatibility, in the constituent of this invention, concrete — the ultraviolet ray absorbent for antihalation, 2 [ for example, ], 2', 4, and 4' — a - tetra-hydroxy benzophenone — 4-dimethylamino - 2', a 4'-dihydroxy benzophenone, a 5-amino-3-methyl-1-phenyl-4-(4-hydroxy phenylazo) pyrazole, A 4-dimethylamino-4'-hydroxyazobenzene and 4-diethylamino -4'-ethoxy azobenzene, Moreover, the surfactant for striae SHON prevention, [ curcumine / 4-diethylamino azobenzene, ] For example, Fluorad FC-430, FC431 (a trade name, product made from Sumitomo 3M), EFUTOPPU EF122 — A and EF122 — B and EF122 — addition content of the fluorochemical surfactants, such as C, EF126 (a trade name, product made from TOKEMU Products), and the megger fuck R-08 (Dainippon Ink & Chemicals, Inc. make), etc. can be carried out in the range which does not have trouble in the purpose of this invention. Furthermore, in order to raise sensibility, a with a weight average molecular weight [ like the tris phenols which are the esterified objects used for the above-mentioned (b2) component ] of about 200 to 600 low-molecular-weight phenol can also be blended.

[0019] If an example is shown about the suitable operation of the constituent of this invention, melt first the (A) component, the (B) component, and the addition component used if needed to the (C) organic solvent, and apply the obtained solution on a glass angle substrate with a spinner etc., and will dry, a sensitization layer will be made to form, and, subsequently ultraviolet rays will be exposed through a desired mask pattern using the light source which emits light, for example, a low pressure mercury lamp, a high pressure mercury vapor lamp, an ultrahigh pressure mercury lamp, a xenon lamp, etc. Next, if negatives are developed and the pure-water rinse of this is carried out with a developer, for example, an alkaline water solution like a 1 - 10-% of the weight tetramethylammonium hydroxide (TMAH) water solution, dissolution removal is carried out and



the exposure section can obtain an image faithful to a mask pattern. Moreover, [0020] which may carry out postbake if needed

[Example] Hereafter, an example and the example of a comparison explain this invention further.

100g of cresol novolak resin of the weight average molecular weight 4000 obtained by adding oxalic acid and formalin to mixture (example of manufacture 1m-cresol 60 mol % and 40 mol % of p-cresol), and carrying out a condensation reaction was dissolved in 2-heptanone 400g. On the other hand, naphthoquinone -1 and 2-diazo-5-sulfonic-acid chloride 75g (0.28 mols) and triethylamine 25g (0.25 mols) were dissolved in 2-heptanone 300g, and this was applied to the above-mentioned resin solution for 20 minutes, and it was dropped, having written with 25 degrees C and \*(ing). It wrote with this temperature further for after [ dropping ] 60 minutes, and \*(ed). Subsequently, 50g of hydrochloric acids was added 35%, and it wrote for 60 minutes, and \*(ed), and superfluous triethylamine was neutralized. And in order to remove an unnecessary salt from this solution, it flowed into about 1000g of pure water, and it wrote enough and \*(ed). Subsequently, 2-heptanone layer was extracted, it condensed after rinsing, and 700g of 2-heptanone solutions which contain an esterification product 23% of the weight was obtained.

[0021] In the example 1 of example of comparison manufacture 1 manufacture, 100g of cresol novolak resin of the weight average molecular weight 18000 obtained by adding oxalic acid and formalin to mixture (m-cresol 60 mol % and 40 mol % of p-cresol), and carrying out a condensation reaction was dissolved in 2-heptanone 400g. 700g of 2-heptanone solutions which contain an esterification product 20% of the weight was obtained like the example 1 of manufacture below.

[0022] The 2-heptanone solution 80 weight section containing 23 % of the weight of esterification products manufactured in the example 1 of the cresol novolak resin 100 weight (section B) component (b1) component manufacture of the weight average molecular weight 4000 obtained by adding oxalic acid and formalin to mixture (example 1(A) component m-cresol 36 mol % and 64 mol % of p-cresol), and carrying out a condensation reaction (esterification products are the 18.4 weight sections to the (A) component 100 weight section)

Components 2, 3, and 4, one mol of 4'-tetra-hydroxy benzophenones and a naphthoquinone -1, and 2.3 mols [ of 2-diazo-5-sulfonyl chloride ] an esterification object 6 weight section and other component nonionic fluorine and a silicone system surfactant : The trade name megger fuck R-08 (b2) The 0.025 weight sections are dissolved in the propylene-glycol-monomethyl-ether mono-acetate 250 weight section. (Dainippon Ink & Chemicals, Inc. make) The weight ratio of propylene-glycol-monomethyl-ether mono-acetate and 2-heptanone prepared the positive type photoresist constituent for liquid crystal device manufacture which consists of a mixed solvent of 8:2. After carrying out spinner spreading of the prepared positive type photoresist constituent so that it may become 2.0 micrometers of thickness on the glass substrate (360mmx460mm) with which Cr film was formed, temperature of a hot plate was made into 130 degrees C, spacing of about 1mm was opened, 1st desiccation was performed for 60 seconds, subsequently 2nd desiccation was performed for 60 seconds at 110 degrees C on the hot plate, and the paint film was obtained. Subsequently, it exposed using mirror projection aligner MPA-600FA (Canon, Inc. make) through the test chart mask. Subsequently, by being immersed for 65 seconds into a 2.38-% of the weight tetramethylammonium hydroxide water solution, the exposure part was removed and the 2.0-micrometer resist pattern was formed on Cr film. Thus, the cross-section configuration of the obtained resist pattern

was the good thing which rose steeply perpendicularly from the substrate. Moreover, the base material which prepared the resist layer from which six kinds of thickness differs resist thickness from 2.0 micrometers to 4.4 micrometers per 0.4 micrometers like the above-mentioned actuation was prepared. When patterning of each base material was carried out on the same lithography conditions as the above, the resist pattern was formed even to the base material of the 4.4 micrometers of the maximum thickness.

[0023] In example 2 example 1, the positive type photoresist constituent for liquid crystal device manufacture was prepared like the example 1 except having replaced the component (b2) with the one mol of bis(4-hydroxy - 2, 3, 5-trimethyl phenyl)-2-hydroxy phenylmethanes, a naphthoquinone -1, and 2.0 mols [ of 2-diazo-5-sulfonyl chloride ] esterification object 4 weight section. Subsequently, when patterning was carried out on the same lithography conditions as an example 1, the 2.0-micrometer resist pattern was formed and the cross-section configuration of the resist pattern was the good thing which rose steeply perpendicularly from the substrate. Moreover, when patterning of six kinds of base materials with which thickness differs similarly was performed, the resist pattern was formed even to the base material of the 4.4 micrometers of the maximum thickness.

[0024] In example of comparison 1 example 1, the component (b1) was excluded, it considered only as the component (b2), and the positive type photoresist constituent for liquid crystal device manufacture was prepared like the example 1 except having changed the amount into 20 weight sections. Subsequently, when patterning was carried out on the same lithography conditions as an example 1, the 2.0-micrometer resist pattern was formed and the cross-section configuration of the resist pattern was a taper configuration. Moreover, when patterning of six kinds of base materials with which thickness differs similarly was performed, the resist pattern was not able to be formed with the base material of the 3.2 micrometers of the maximum thickness.

[0025] In example of comparison 2 example 1, the positive type photoresist constituent for liquid crystal device manufacture was prepared like the example 1 except having changed the component (b1) into the resin ester solution of the example 1 of comparison manufacture, and having changed the amount into 92 weight sections (esterification product 18 weight section). Subsequently, when patterning was carried out on the same lithography conditions as an example 1, the 2.0-micrometer resist pattern was formed and the cross-section configuration of the resist pattern was an inverse tapered shape configuration. Moreover, when patterning of six kinds of base materials with which thickness differs similarly was performed, the resist pattern was not able to be formed with the base material of the 4.0 micrometers of the maximum thickness.

[0026] In example of comparison 3 example 1, the positive type photoresist constituent for liquid crystal device manufacture was prepared like the example 1 except having changed the component (b1) into the esterification product solution of the example 1 of comparison manufacture, and having changed the amount into the 250 weight sections (esterification product 50 weight section). Subsequently, when patterning was carried out on the same lithography conditions as an example 1, the 3.0-micrometer resist pattern was formed and the cross-section configuration of the resist pattern was an inverse tapered shape configuration. Moreover, when patterning of six kinds of base materials with which thickness differs similarly was performed, the resist pattern was not able to be formed with the base material of the 2.8 micrometers of the maximum thickness.

[0027] In example of comparison 4 example 1, the positive type photoresist constituent for liquid crystal device manufacture was prepared like the example 1 except having changed into the cresol novolak resin of the weight average molecular weight 12000 obtained [ formalin / oxalic acid and ] by mixture (m-cresol 60 mol % and 40 mol % of p-cresol) by adding and carrying out a condensation reaction in the (A) component. Subsequently, when patterning was carried out on the same lithography conditions as an example 1, the 1.6-micrometer resist pattern was formed and the cross-section configuration of the resist pattern was a taper configuration. Moreover, when patterning of six kinds of base materials with which thickness differs similarly was performed, the resist pattern was not able to be formed with the base material of the 4.4 micrometers of the maximum thickness.

[0028]

[Effect of the Invention] According to this invention, it excels in the perpendicularity of a resist pattern configuration, and the positive type photoresist constituent for liquid crystal device manufacture with few thickness dependencies of definition can be offered cheaply.

---

[Translation done.]